Small Business Innovation Research/Small Business Tech Transfer

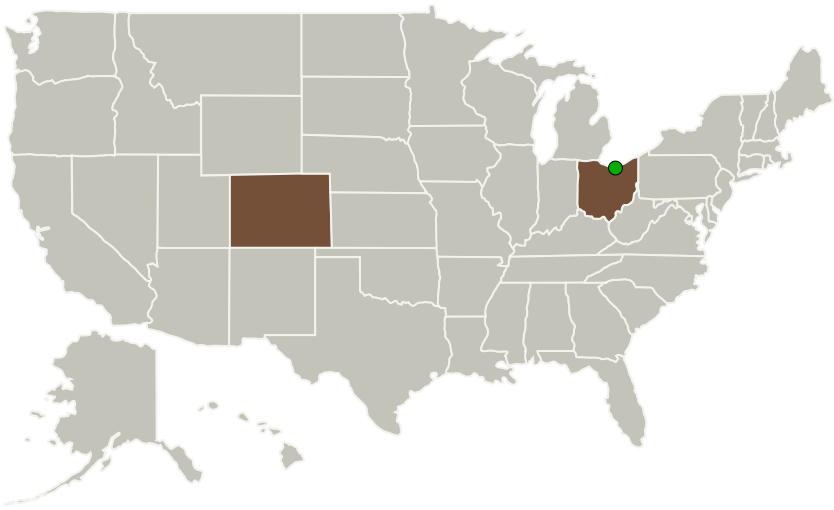
Coherent Optical Transceiver using Circular Polarization-Based Balanced Mixing, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

Boulder Nonlinear Systems (BNS) proposes to use its electro-optic component and subsystem expertise to transition a patented heterodyne detection scheme previously conceived by BNS for LIDAR to application in satellite based laser communications. The proposed effort will leverage past and present contracts in free space optical communication and space qualification of components. The proposed transceiver, which can be demonstrated with COTS components, is independent of platform orientation and path length differences. In addition BNS will investigate replacing the transceiver's conventional crystal modulator with a low voltage polymer electro-optic modulator. The proposed work plan entails demonstration of the path length and orientation insensitivity of the detection scheme as well as implementation of an electro-optic polymer based modulator for 1550 nm laser radiation. In addition to the proof of principle demonstration, Boulder Nonlinear Systems proposes to perform a design study to determine the size, weight and power of the transceiver subsystem and develop a road map for space qualification of the technology. A follow-on Phase II effort would result in a prototype laser communication subsystem with potential for satellite based application.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Boulder Nonlinear Systems, Inc.	Lead Organization	Industry	Lafayette, Colorado
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Colorado	Ohio

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138871)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Boulder Nonlinear Systems, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

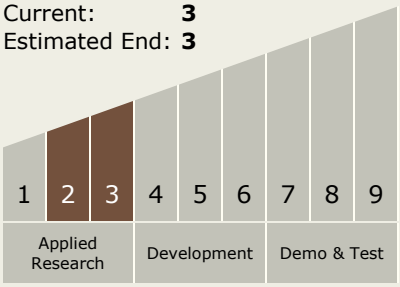
Carlos Torrez

Principal Investigator:

Jay Stockley

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.1 Optical Communications
    - TX05.1.1 Detector Development

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System